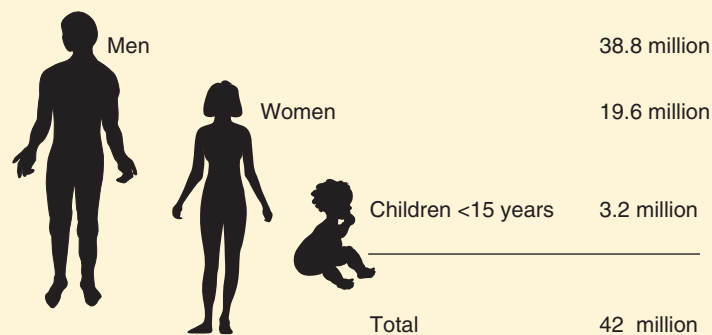


## Box 2–3

### Social Impacts of Emerging Infectious Disease

The definition of disease in medical dictionaries spans many pages to provide succinct generalizations of disease conditions from A (i.e., Acosta's disease or acute mountain sickness) to Z (i.e., zymotic disease or a disease due to the action of an enzyme...).<sup>349</sup> In contrast, the definition of disease in a standard dictionary, while still focusing on impacts on organism form and function, is brief and includes an added dimension, "...a harmful development (as in a social institution)."<sup>350</sup> Disease affects our economy, behavior, and governmental regulations. Thus, emerging infectious diseases often have impacts that extend far beyond the clinical manifestations of specific diseases on individuals, the economic costs for diagnosis and treatment, and those collective costs on individuals, families, and populations. AIDS is but one of many examples.

Number of people living with HIV/AIDS in 2002



The emergence of AIDS has been accompanied by social stigma for individuals testing positive for HIV, regardless of whether or not they have clinical disease. Various forms of discrimination have appeared in the work place and in other components of society as a response to beliefs, perspectives, and fear of AIDS. A variety of regulatory and procedural changes have been implemented that impact health-care providers, blood banks, and education processes. Other adjustments in human behavior, our activities, and our way of life have also resulted from the emergence of this disease. Clearly, the burden of AIDS extends far beyond the pathogenesis of the causative virus. Similar broad-based responses are often associated with wildlife species that harbor diseases of concern.

#### Chronic Wasting Disease

Deer hunting is a traditional activity for millions of Americans and in many rural areas it remains an important social activity with significant economic ramifications for communities. This activity also has significance for wildlife management agencies. For example:

- In 1996, hunters spent \$897 million within Wisconsin in pursuit of their hunting activities. Those expenditures support a great deal of employment and provide a foundation for wildlife programs such as land acquisition and management, wildlife education, and research.<sup>351</sup>

- During recent years, more than 600,000 Wisconsin deer hunters have been spending nearly \$500 million annually in pursuit of their sport.<sup>352</sup>
- Deer hunting licenses in Wisconsin contribute \$21 million, or about one-third of the Wisconsin wildlife management budget.<sup>353</sup>

As with AIDS, public perceptions and fear about chronic wasting disease (CWD) are causing major adjustments in human behaviors, regulatory processes, agency and scientific priorities, and resource allocations. The general basis for human concern about CWD lies in the causative agent being a prion, the same type of agent responsible for bovine spongiform encephalopathy (BSE) or "mad cow disease." Transformation of that agent has resulted in a



Photo by Christina Sigurdson

variant Creutzfeldt-Jakob agent that has caused approximately 100 human fatalities.<sup>354</sup> Public concern is that a similar variant may evolve from prions associated with CWD. Agriculture agencies also are concerned because several captive elk and deer herds associated with game ranching and commerce have been infected by CWD. Another concern is that a high prevalence of CWD in wild cervids may enhance the potential for a variant to evolve and infect livestock.

Because of CWD's negative impacts on deer and elk health and survival, and the social and economic importance of these species, wildlife conservation interests also are involved. The focus for wildlife agencies is eradication of CWD where possible and preventing its spread to other states where this disease does not already exist. The result of these concerns is an unprecedented effort focused on combating a disease affecting free-ranging wildlife.

- A multiagency plan involving the collaboration of 9 federal agencies, 14 state agencies, 4 universities, the International Association of Fish and Wildlife Agencies, and others was developed to guide a coordinated effort to combat CWD.<sup>348</sup>
- CWD has been present in Colorado for several decades and recently the Colorado Division of Wildlife completed a 5-year Strategic Plan that establishes disease management and elimination as one of its highest priorities.<sup>355</sup>

Fiscal support for many state wildlife agencies is highly dependent upon license sales. Concern about consuming deer meat reduced Wisconsin deer license sales, which negatively impacts fiscal resources for carrying out deer and other wildlife conservation responsibilities. During 2001, the Wisconsin Department of Natural Resources sold over 688,000 licenses to hunt deer. Survey results indicated a 10 to 20 percent reduction during 2002.<sup>352,353</sup> This relatively small percentage reduction results in a substantial loss of revenue and is compounded by the costs to combat CWD.

The 2002 appearance of CWD in white-tailed deer in Wisconsin has been costly. The resources required to combat CWD, even with supplemental funding, burdens agency capabilities by redirecting funds and agency staff, thereby, compromising the ability to address other needs.

- An intensive surveillance and testing program was implemented to determine the geographic distribution of CWD in Wisconsin. Hunter participation is a major component of these types of programs and the testing provides hunters with evaluations of the deer they harvest.
- Construction of a state facility was required to process the estimated 40,000 Wisconsin deer heads for sample extraction during 2002. Also, many people were needed to collect the deer heads in the field, to process them for sample extraction, and to do laboratory evaluations.

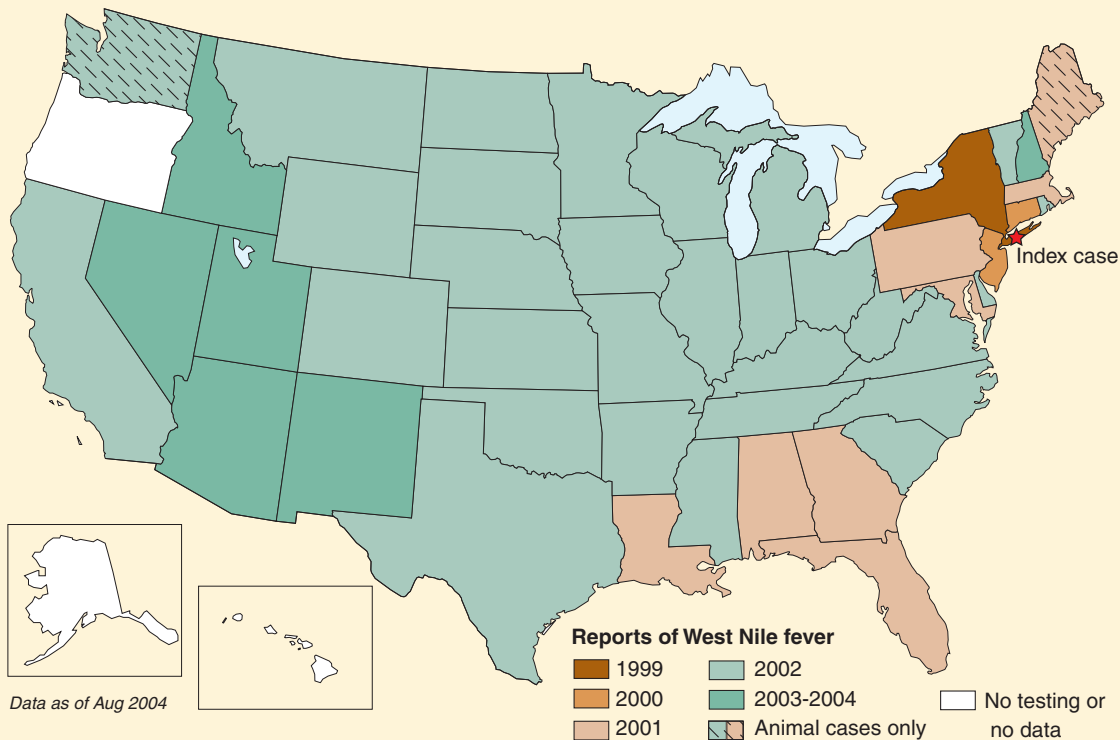
There also are general community costs associated with CWD. For example:

- The projected net loss to Wisconsin's economy as a whole from reduced spending by nonresident deer hunters alone was estimated to be approximately \$5 million to \$10 million for 2002.<sup>352</sup>



Photo by Milton Friend

- A variety of regulations promulgated in response to CWD and the processes for their enforcement impose still other costs, including adjustments in human activities. Those regulations establish inter- and intrastate conditions for the movement of live elk and deer, their carcasses, and components of those animals that have been harvested by hunters and commercial activities.<sup>351,354-357</sup>
- CWD in North America has resulted in the suspension by South Korea and Japan of the importation of deer, elk, and their products from the United States and Canada.<sup>356</sup>
- Indemnity payments are provided by the United States Department of Agriculture (USDA) for the voluntary depopulation of captive **cervid** herds within the United States that are infected with CWD.<sup>356</sup>
- Small business operations such as taxidermists, processors of elk and deer, and a variety of other services provided to deer hunters also are negatively impacted, as are deer and elk farms found to be positive for CWD.



Impacts from CWD are most notable in rural areas where deer hunting is a popular activity and are felt by those communities in many ways.

- Motels, restaurants, gas stations, and a number of other local businesses in rural areas are quite dependent upon deer hunting to bring business to their community during deer season.
- The revenue for a small, rural Wisconsin feed store in an area removed from the CWD focal area fell by tens of thousands of dollars due to the 2002 statewide ban on deer feeding, one of the disease-control actions initiated. A large business operation projected a reduction of \$300,000 in revenue due to that ban.<sup>353</sup>
- A small business that sells archery equipment suffered a reduction of more than 50 percent of normal sales because of reduced deer-hunting activity.<sup>353</sup>

Clearly, the economic impacts in Wisconsin associated with CWD have substantial ramifications. Impacts of this disease outbreak on agencies and local communities are striking, especially considering the absence of a single documented human or livestock case of disease attributed to CWD during the more than two decades that this disease has been present in limited areas of the Western United States.

## West Nile Fever

The 1999 appearance in North America of West Nile fever (WNF) is another vivid example of human impacts associated with disease emergence in wildlife. Unlike CWD, WNF is clearly a zoonosis. Its appearance was first detected because of a cluster of human cases, including several deaths, in the New York City area. The human cases occurred along with a cluster of bird deaths, primarily **crows**. Since 1999, this disease has spread across the USA and into Canada. The host range for WNF includes horses as well as other domestic animals, a broad array of wildlife species (primarily birds), and humans. Thus, like CWD, attempts to combat WNF have an interagency orientation and are multifaceted.

- Shortly after the diagnosis of WNF in New York City, the Centers for Disease Control and Prevention (CDC) and the USDA cosponsored a workshop and developed guidelines for disease



Photo from USGS files



Photo by Milton Friend

surveillance, prevention, and control. Experts from federal, state, and city agencies joined members of the academic community and the private sector in that undertaking.<sup>358</sup>

- National guidelines developed for the control of West Nile virus (WNV) place a high priority on monitoring for the virus and providing guidance for the timing of that activity based on geographic regions in the USA.<sup>358</sup>
- Training workshops, protocols for diagnostic and surveillance activities, and data management are some of the integrated efforts established to combat WNV.

Many agencies are incurring substantial costs for the surveillance and testing programs needed for guiding actions to protect human health. In addition, because of the risks to human health, mosquito abatement activities have increased, as well as the level of protective measures required for processing wildlife in disease diagnostic laboratories.

CWD and WNF are but two of the multitude of emerging and reemerging infectious diseases confronting society. Human activities and behavior are major factors contributing to disease emergence. Hopefully, greater appreciation of the effects of these diseases on our way of life and things that we value will result in behavior that reduces the spread of pathogenic microorganisms.

- In early December 2000, the CDC provided 16 States and local health departments along the East Coast of the USA with \$2.5 million to enhance their surveillance for WNV and to develop local measures to prevent outbreaks. Pennsylvania anticipated it would spend \$9.8 million in addition to CDC funds to develop internal mosquito-control and surveillance plans.<sup>360</sup>
- During the spring of 2001, New York received a \$3.9 million grant from CDC to combat WNV, in addition to the \$21.9 million for local virus control activities proposed by the Governor in the State budget to cover 2000–2001 costs.<sup>359</sup>
- During 2000 and 2001, the CDC provided more than \$58 million to State or local health departments to develop or enhance epidemiologic and laboratory capacity for WNV and other mosquito-borne diseases. In fiscal year, 2002, approximately \$35 million in federal funds were awarded by the CDC to these agencies to address the continued spread of the virus.<sup>361</sup>
- Other societal costs include major investments in research on disease ecology and evaluation of vaccination as a means for combating WNF.

WNF also has ramifications for wildlife conservation and education programs. Many thousands of birds have died from this disease. Also, the specter of WNF looms as an ominous shadow over wildlife rehabilitation. The rehabilitation of sick and injured wildlife is a popular activity and one that is primarily carried out by the private sector rather than by government agencies. Thousands of individuals participate, the majority as volunteers that have very limited training and knowledge of animal diseases. In general, the facilities where these activities are conducted are inadequate for the containment of WNF in the event of an outbreak. Also, protective measures for people are seldom adequate to prevent disease exposure in the event infectious disease is brought into the facility. The emergence of WNF calls for additional knowledge of disease risks within wildlife rehabilitation programs and adjustments in how rehabilitation programs are conducted. WNF has also struck zoos, causing many bird deaths, and threatens captive breeding programs that enhance the populations of endangered avian species.